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Job No.: CTCE/BBMP/W.No.10/KRIDL/WMM/S-T/2014-15 03.11.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of Work	Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	03.11.2014

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Result : Flakiness Index = **11.52%**

Elongation Index = **13.84%**

Result : Combined Flakiness & Elongation index 25.36%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

Note:

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QUALITY CONTROL REPORTS FOR

SEMI DENSE BITUMINOUS CONCRETE

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Job No.: CTCE/BBMP/W.No.10/KRIDL/QB(SDBC)/2014-15 20.11.2014

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

CLIENT	:	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	:	**Technical Manager,** KRIDL, Bangalore.
NAME OF THE WORK	:	Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	:	EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
SAMPLE ID	:	Hot mix Plant, Bangalore
DATE OF TESTING	:	20.11.2014

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The results of the tests conducted on the bitumen sample for Semi Dense Bituminous Concrete are as follows:

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	88	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	47	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	286	Min. 220

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20.11.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
Source / Location	Hotmix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	20.11.2014

Sl No.	Details	Trial No. 1	Trial No. 3	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	388	385	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	84	87	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	304	298	
4	Aggregate Impact value = percent fines	21.65	22.60	
	100* (W_2/W_1)%			22.12

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Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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20.11.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
Source / Location	Hotmix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	20.11.2014

Sl No.	Details	Trial No. 1	Trial No. 3	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	385	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	84	83	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	298	302	
4	Aggregate Impact value = percent fines $100^* (W_2/W_1)\%$	21.99	21.56	**21.77**

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.10/KRIDL/SDBC/Shape.T/2014-15 : 20.11.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	: **Technical Manager,** KRIDL, Bangalore.
Name of Work	: Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	: EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 20.11.2014

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Flakiness Index = **11.52%**

Elongation Index = **13.85%**

Result : Combined Flakiness & Elongation index 25.37%

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	: **Technical Manager,** KRIDL, Bangalore.
Name of Work	: Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	: EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 20.11.2014

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Flakiness Index = **12.48%**

Elongation Index = **13.67%**

Result : Combined Flakiness & Elongation index 26.15%

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.10/KRIDL/SDBC/Stripping/2014-15 22.11.2014

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the work	Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
Type of Mix	Semi Dense Bituminous Macadam
Date of Testing	22.11.2014

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Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.3	3.27	96.73
2	3.1		
3	3.4		

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Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Macadam is 95%

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Job No.: CTCE/BBMP/W.No.10/KRIDL/SDBC/Sp_Wa/2014-15 22.11.2014

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
Source / Location	Hotmix Plant, Bangalore.
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	22.11.2014

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2029	2028	2030	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1279	1278	1280	
4	Weight of saturated surface dry aggregate in air	W_3 g	2024	2027	2025	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	745	749	745	
6	Weight of oven dried aggregate	W_4 g	2011	2010	2013	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.699	2.684	2.702	2.701
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.747	2.746	2.746	2.747
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.65%	0.85%	0.60%	0.62%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.10/KRIDL/SDBC/Bit/2014-15 22.11.2014

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AS per IRC:SP:-1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager,** KRIDL, Bangalore.
NAME OF THE WORK	Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
SAMPLE I/D	Roads in Ramanna Garden Ward No.10
DATE OF TESTING	22.11.2014

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BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475	474
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25	26.00
7. Bitumen content in %	5.00	5.20
8. Average	**5.10**	

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Job No.: CTCE/BBMP/W.No.10/KRIDL/SDBC/Bit/2014-15 22.11.2014

BITUMEN CONTENT GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager,** KRIDL, Bangalore.
NAME OF THE WORK	Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
SAMPLE I/D	Roads in Ramanna Garden Ward No.10
DATE OF TESTING	22.11.2014

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GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-4 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	26.31	5.54	5.54	94.46	90-100
4.75	259.6	54.65	60.19	39.81	35-51
2.36	64.52	13.58	73.77	26.23	24-39
1.18	45.65	9.61	83.39	16.61	15-30
0.3	25.32	5.33	88.72	11.28	9-19
0.075	26.32	5.54	94.26	5.74	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-4 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	33.25	7.01	7.01	92.99	90-100
4.75	257.3	54.28	61.30	38.70	35-51
2.36	52.32	11.04	72.34	27.66	24-39
1.18	32.52	6.86	79.20	20.80	15-30
0.3	35.21	7.43	86.62	13.38	9-19
0.075	32.62	6.88	93.51	6.49	3-8

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Aggregate Gradation Test

IS : 2386 Part I

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Asphalting to roads in Ramanna Garden Ward No.10 (Doddabommasandra) Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/KRIDL/W.O/675/2013-14 Dated: 05.03.2014
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	20.11.2014

Total Weight of Sample: **5350** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	345	6.4	6.45	93.55	90-100	
4.75	2595	48.5	54.95	45.05	35-51	
2.36	650	12.1	67.10	32.90	24-39	
1.18	455	8.5	75.61	24.39	15-30	
0.3	425	7.9	83.55	16.45	9-19	
0.075	465	8.7	92.24	7.76	3-8	

Total Weight of Sample: **5400** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	250	4.6	4.63	95.37	90-100	
4.75	2615	48.4	53.06	46.94	35-51	
2.36	845	15.6	68.70	31.30	24-39	
1.18	530	9.8	78.52	21.48	15-30	
0.3	450	8.3	86.85	13.15	9-19	
0.075	425	7.9	94.72	5.28	3-8	

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